

HEPATITIS: a general term meaning *inflammation of the liver*.

- Hepatitis can be caused by:
 - Alcohol
 - Drugs
 - Chemicals
 - Toxins
 - Autoimmunity (your immune system attacks your own body)
 - Viral infections (hepatitis A, B, C, D, E, G).
- The viruses were named in order of their discovery.
- Hepatitis C is a very small RNA virus.
- Hepatitis C enters the bloodstream, goes into liver cells and reproduces (replicates) very quickly.
- Your body attacks the infected cells, causing the liver to become inflamed.
- The infected liver produces up to *a trillion hepatitis C particles a day* – many more than the billions of HIV produced in the body each day.
- Hepatitis C lives a long time outside of the body - much longer than HIV.
- There is no vaccine for hepatitis C.
- Hepatitis C is now considered an opportunistic infection, per the 1999 USPHS/IDSA (US Public Health Service/Infectious Disease Society of America) guidelines for treating/preventing AIDS opportunistic conditions.

THE LIVER, our largest internal organ:

- converts food, alcohol, chemicals and drugs into substances to be used by or excreted from the body;
- makes bile to help digest food;
- stores vitamins and minerals;
- manufactures protein and nutrients;
- converts nutrients into energy;
- stores sugar and controls the level of sugar in our bloodstream;
- regulates fat storage;
- regulates blood clotting;
- *has the amazing ability to regenerate (regrow) cells.*

HISTORY OF HEPATITIS C

- **1948:** blood samples stored since 1948 contain antibodies to hepatitis C – earliest *known* hepatitis C infection.
- **1970's:** the virus appears in enough people to be noticed. Called non-A, non-B hepatitis (NANB).
- **1987:** Identified as hepatitis C.
- **1990:** Antibody test helps identify people exposed to the virus and is used to screen blood.
- **July 1992:** Better tests insure the safety of the blood supply.

SOME STATISTICS

- 3% of the world population is infected with hepatitis C (150 - 200 million people).



- Four to five million people in the United States are living with hepatitis C.
- 40 - 55% of people with HIV are co-infected with hepatitis C.
- Up to 90% of people who acquired HIV through injection drug use are co-infected.
- 8,000-10,000 Americans will die this year from hepatitis C-related complications.
- Expected to rise to 40,000 by 2015.
- Liver failure due to hepatitis C is the leading cause of liver transplants in the US.
- 15,000 Americans are on waiting lists for liver transplants.

TRANSMISSION

Blood-borne virus (contracted through **blood-to-blood contact**).

- Anyone who received a blood transfusion or used blood products (clotting factor) before July 1992 is at risk.
- Health care workers can be infected through needle sticks.
- Most new infections (36,000 in 1996) are due to needle sharing (injection drug use, including steroids).
- Body piercing, tattooing or acupuncture with unsterilized needles carries a risk.
- Sharing things that can hold or transmit blood—snorting straws, toothbrushes, razors, manicure implements—can put you and others at risk.
- Perinatal transmission from mother to baby occurs in less than 6% of pregnancies - can be as high as 25% if the mother is also HIV-positive. Mothers in the acute phase of hepatitis C infection (shortly after initial infection) or with serious liver damage have a higher risk of transmitting hepatitis C to the baby.
- Breast-feeding is considered safe - but **not** if you're co-infected.
- Risk of sexual transmission is small. Traces of virus have been found in semen, saliva, and vaginal secretions in some studies, while other studies have found none. Anal intercourse may increase the risk because of the greater possibility of torn tissue.

GETTING TESTED

- Hepatitis C **antibody test** (ELISA): similar to the HIV antibody test; looks for antibodies that the immune system produces usually within 3 months of exposure (unless severely immunocompromised). False positives occur 25% of the time.
- **Qualitative hepatitis C PCR** (viral load) tells whether there are any hepatitis C virus particles present in blood.
- The incubation period for hepatitis C is two weeks to six months. If PCR is negative, repeat in six months.
- If HIV-positive and ELISA is negative for hepatitis C, get a qualitative hepatitis C PCR.



SYMPTOMS

There's no such thing as a "typical" hepatitis C infection.

Only 25% have symptoms when first infected. These might include:

- weight loss
- low-grade fever
- headaches
- loss of appetite
- nausea
- stiff or aching joints
- pain in the right side, over the liver area
- dark brown urine
- pale feces
- fatigue and/or depression
- jaundice (the whites of the eyes and skin become yellowish)

Usually no symptoms until (or unless) the liver is seriously damaged - **ten to thirty years** after infection.

PROGNOSIS

15%: the immune system clears the virus in three to six weeks.

Remaining 85%: hepatitis C is a **chronic infection** (the body isn't able to rid itself of the virus and keeps trying to fight it).

25%: no symptoms or serious liver damage.

Includes some people with **fibrosis** (mild scarring of the liver).

40-50%: some liver damage, but not enough to be severely detrimental to health.

10-20%: eventually develop **cirrhosis** (scar tissue between the liver cells).

1-4% of cirrhotic patients develop liver cancer (hepatocellular carcinoma).

- No way to tell who will develop serious fibrosis, cirrhosis or liver cancer and who will live for decades with chronic hepatitis C infection but no serious damage.
- The more scar tissue, the fewer healthy cells to keep the liver functioning properly.
- If co-infected with HIV and hepatitis C:
 - Hepatitis C replicates faster than if infected only with hepatitis C – without treatment, liver damage can progress up to 10 times faster.
 - HIV viral load isn't usually effected by hepatitis C.



MONITORING WHAT'S GOING ON

If chronically infected with hepatitis C, these diagnostics (tests) can help measure the condition of the liver and help in making treatment decisions.

- Liver Function Tests (LFTs): **Liver enzymes** are secreted into the blood as liver cells are damaged or die. Monitor every six months.
 - ALT** (alanine aminotransferase): normal range 5-60 IU/L.
 - AST** (aspartate aminotransferase): normal range 5-43 IU/L.If taking medications, enzymes may be high as the liver works to metabolize them (break them down). If the liver is in bad shape, enzyme levels may be normal or low because the liver is too worn out to make the enzymes.

About 1/3 of people with hepatitis C have enzyme levels within normal range.
Enzyme levels don't predict what may happen to the liver.
- **Quantitative hepatitis C PCR (viral load)**: measures the amount of hepatitis C virus in the blood. Below 1000 copies is undetectable.
 - < 1 million is considered low
 - 2 – 5 million is considered moderate to highNo comparison between hepatitis C viral loads and those for HIV.

Viral load doesn't predict what's going on. Little information yet about the correlation between hepatitis C viral load levels and the likelihood of current or future liver damage.
- **Liver biopsy**: the most accurate way to measure the degree of liver damage (inflammation, fibrosis, cirrhosis).

Results scored on scale from 0 to 4:

 - 0 means no fibrosis or inflammation;
 - 1 means inflammation, no fibrosis
 - 2 means piecemeal necrosis (cell death), with scattered fibrosis
 - 3 means fibrosis with bridging (the scarring "bridges" between blood and tissue tracts, particularly significant in the portal region as the portal vein is the main vein feeding blood to the liver)
 - 4 means scarring is such that liver function is severely impaired, and the liver is actually misshapen.Outpatient procedure, takes a few minutes while awake. A needle is inserted just below the right ribs, into the liver, a small tissue sample is taken out and examined under a microscope by a **pathologist**. A CAT scan or sonogram (ultrasound) often done before biopsy to pick best site for needle insertion. Biopsy can be repeated to assess disease progression over time. Very rarely, a biopsy can cause internal bleeding and death. Some doctors don't require biopsy to make a treatment decision.
- **Genotype**: the genetic make-up of a particular strain of virus.

There are at least six hepatitis C genotypes. Of the three main genotypes (1, 2 and 3), genotype 1 accounts for 73% of United States infections. Knowing a person's genotype is more useful to research than in clinical practice.



CURRENT TREATMENT

Figuring out whether or not to go through treatment for hepatitis C is complicated - even more complicated than with HIV. Some doctors suggest treatment right away, no matter what; others watch liver enzymes and hepatitis C viral load to see how things look. Some doctors require a liver biopsy before starting treatment; other's don't. Making treatment decisions about hepatitis C is more complicated if you're co-infected with HIV. These decisions are very personal and individual.

Alpha-Interferon: a protein produced by the body to interfere with a virus' ability to infect cells.

- Bio-engineered alpha-interferon is injected subcutaneously (under the skin), three times a week or daily, for 6 months to one year.
- Interferons available - Infergen (Amgen), Roferon (Roche) and Intron A (Schering-Plough).
- **Sustained response:** an undetectable hepatitis C viral load six months after finishing treatment (<100 copies per ml).
- Interferon monotherapy (taken alone) achieves a sustained response in only 5 to 25% of people.
- Only 2-7% of people with genotype 1 get a sustained response with interferon monotherapy.
- 40% of those who *do* have a sustained response at 6 months relapse within a year after finishing the regimen.
- If hepatitis C viral load is still detectable after 3 months of interferon monotherapy, treatment is often stopped.

Ribavirin (Rebetol): anti-viral capsules used *in combination* with interferon.

- Combination therapy achieves a sustained response in 33-48% of people (people who had no success with interferon monotherapy *and* people doing treatment for the first time).
- 28% of people with genotype 1 get a sustained response with combination therapy.
- Packaged in a kit with Intron A called Rebetron.
- No studies included HIV-positive people but these are now ongoing.
- Interferon/ribavirin combination treatment is used more often than interferon alone to treat hepatitis C.
- If hepatitis C viral load is still detectable after 3 months of combination therapy, treatment is often stopped for people who have already gone through interferon monotherapy. People who are treatment-naïve often continue, even with detectable viral load at 3 months.

The primary goal of treatment is a healthier liver - **histologic improvement**.

- Improvement is measured by normalized liver enzymes, lower or undetectable viral load, and, sometimes, a follow-up liver biopsy.
- Even without sustained response or significantly lower viral load, the liver may get a much-needed break. Improvement in the degree of liver disease often occurs.



People who respond *best* to treatment:

- people under 40
- women (pre-menopausal)
- people with genotypes 2 or 3
- people with hepatitis C viral loads less than two million copies, and
- people with no cirrhosis.

African-Americans respond much less well to current treatment than Caucasians, Asians or Hispanics.

TREATMENT SIDE EFFECTS

- Interferon side effects, often severe, are usually worse during the first few weeks. Some are short-term, some last longer. Each person experiences them very differently. Possible side effects include:
 - fatigue
 - joint pain (arthralgia)
 - muscle pain (myalgia)
 - fever
 - chills
 - nausea
 - headaches
 - weight loss
 - mild hair loss (alopecia)
 - low white blood cell and platelet counts
 - rapid heart beat (tachycardia)
 - irritability
 - depression
 - suicidal thoughts
- Ibuprofen can help with flu-like side effects.
- Starting antidepressants a couple of weeks before beginning treatment can help.
- Nighttime interferon dosing reduces the frequency of side effects.
- Ribavirin can cause severe **anemia** (reduced red blood cells) - lowering the ribavirin dose is often necessary.
- Both interferon and ribavirin can cause **birth defects**. Men and women who have procreative sex should use effective contraception while on the combination - and for six months afterwards.
- In clinical trials of interferon/ribavirin, 20% of participants dropped out because of side effects or adverse events.



FUTURE TREATMENT

- **Pegylated interferons** (PEG-Intron, Pegasys) will be available soon. They stay in the body longer, so fewer injections and, hopefully, better results. Early data from a small study of Pegasys plus ribavirin show the best results ever achieved with any hepatitis C treatment six months into treatment.
- Currently being studied:
 - higher doses of interferon;
 - beginning treatment with higher interferon dosing at first, then going to three times a week;
 - lower doses of ribavirin, which may give the same benefit with fewer side effects;
 - multi-drug combinations [with amantadine, rimantadine, thymosin alpha, corticosteroids, pentoxifylline (Trental), levamisole, even interleukin-2 (IL-2), interleukin-12 (IL-12), Retrovir (AZT) and Norvir (ritonavir)].
 - hepatitis C/HIV co-infection.
- Therapies in development (2-10 years down the road):
 - protease inhibitors
 - helicase inhibitors
 - polymerase inhibitors
 - antisense nucleotides
 - DNA vaccines
 - IRES inhibitors (internal ribosomal entry site inhibitors)



KEEPING YOUR LIVER HEALTHY

There are many ways to avoid stressing the liver further.

- Get **vaccinated** against hepatitis A and hepatitis B.
Co-infection with hepatitis C and active hepatitis A or B can be *extremely* dangerous.
- Alcohol use increases the risk of cirrhosis *enormously*.
- Large amounts of acetaminophen (Tylenol and many other non-aspirin pain relievers) are toxic to the liver.
- Acetaminophen and alcohol together can cause severe liver damage.
- Avoid exposure to pollutants and chemicals (skin contact & breathing): fumes from paint, paint thinners, chemical solvents, spray adhesives, insect sprays and other aerosol sources.
- Be careful with cleaning products – follow manufacturers' precautions.
- Stick to a nutritional, balanced diet: fresh vegetables, fruits, beans, whole grains, lean meats.
- Avoid foods with high salt, sugar or fat content: cheese, pickles, fast food and processed foods (cookies, cakes, frozen dinners, packaged foods with long shelf lives, "instant" foods).
- Avoid shellfish, raw fish, and high-doses of Vitamins A, D, E or K.
- Avoid fried foods.
- Avoid herbs that are toxic to the liver: peppermint, mistletoe, yerba tea, sassafras, germander, chaparral, skull cap, nutmeg, valerian, Jin Bu Juan, comfrey (bush tea), pennyroyal and tansy ragwortsenna.
- Don't take iron supplements unless advised by your doctor.
- Get a healthy balance of protein in your diet – too much protein can stress your liver and digestive system.
- Get regular exercise and develop a stress reduction plan
- Find a doctor who understands hepatitis C - a **gastroenterologist** (stomach and bowel specialist) or **hepatologist** (liver specialist) and some **infectious disease** doctors.

ALTERNATIVE THERAPIES

Many people use herbal products. There is very little information on how effective they are. All substances, including herbs, can have dangerous side effects - especially at high doses. Talk with your doctor or pharmacist before using alternative therapies or other medications - including over-the counter ones.

Herbs and herbal products with the most data, as well as most widely used, include:

- **milk thistle (silymarin)** acts as an antioxidant, stimulating the regeneration of liver cells.
- **astragalus** enhances immune function by increasing the activity of various white blood cells and boosting the production of antibodies and natural interferon.
- **dandelion**, boiled or in capsule form, is used for all kinds of liver problems.
- **bupleurum** reduces liver inflammation and protects the liver from toxic damage;
- **garlic** detoxifies and protects the body from infection, and strengthens blood vessels. *The high sulfur content of raw garlic can cause dermatitis and colitis. Garlic can also inhibit blood clotting and interfere with thyroid function.*
- **licorice root** contains glycyrrhizin, which has antiviral activity and may be effective in treating viral hepatitis. *Potassium can be depleted with long-time use of licorice. In very high doses, glycyrrhizin can cause high blood pressure, water retention, and possibly heart complications.*



- **vitamin E** is often used in hepatitis C because it's supposed to assist the liver in detoxifying the blood and slow down the development of fibrosis. *High-dose vitamin E (more than 800mg a day) can be toxic to the liver.*
- **artichoke** promotes the outflow of bile from the liver to the gall bladder.
- **thioctic (alpha-lipoic) acid** is a natural antioxidant that is often used because of its ability to help maintain and restore liver health.

TAKING CARE OF YOURSELF & OTHERS

- Don't share:
 - drug paraphernalia (needles, syringes and snorting straws);
 - toothbrushes, razors, manicure implements;
 - other items that can retain blood.
- If you've been sharing needles, consider telling your running mates so they have the option to check their hepatitis C status.
- Although sexual transmission of hepatitis C appears to be relatively minimal, practice safer sex - particularly if you have multiple sexual partners.
- Do **not** avoid normal social contact. Hug, kiss, and cook to your heart's content!
- Keep track of all test results - liver enzyme levels, viral load, and genotype.
- If there's no indication of liver problems, see your doctor or health care provider every six months for regular blood work.



SPECIAL CONSIDERATIONS FOR PEOPLE WHO ARE CO-INFECTED

- HIV speeds up the progression of hepatitis C in most co-infected people.
- Hepatitis C seems to have little impact on the progression of HIV except in people with hemophilia.
- All protease inhibitors and non-nucleosides are processed through the liver. If you begin HIV anti-viral treatment, your hepatitis C viral load may go up as your liver works to break down the anti-virals. In most cases, this flare-up will go away relatively quickly.
- If your liver is badly damaged by hepatitis C (or for any other reason), it's hard for your body to absorb HIV medications, especially protease inhibitors and non-nucleosides. This can lead to a higher HIV viral load and severely limited HIV treatment options.
- Ribavirin *decreases* Retrovir (AZT) phosphorylation (part of the chemical process of the drugs once they're in your body). The same is true of Zerit (d4T), although to a lesser extent. This has been seen in test-tube studies, but not in human studies yet. Hypothetically, this could make you develop quicker resistance to the Retrovir or Zerit.
- Ribavirin *increases* Videx (ddI) phosphorylation, which could make Videx work better for you. Since phosphorylation doesn't really increase drug levels in your blood, this wouldn't necessarily make the side effects from Videx any worse.
- One of the most severe side effects of ribavirin is anemia (lowered red blood cell counts), so regular blood work is particularly important. Anemia is also a possible side effect of Retrovir (AZT), so it may be best to avoid using both ribavirin and Retrovir.
- High doses of interferon can lower T cells (CD4s).
- Interferon may be harmful to the immune response of some people with HIV.
- The risk of transmitting hepatitis C may be greater if you're also HIV-positive because you're more likely to have a higher hepatitis C viral load.
- A doctor or other health care provider who knows HIV really well doesn't necessarily know hepatitis C. And vice versa!



SAFER INJECTING

Shooting up or injecting can be the riskiest way to get high. HIV, hepatitis B and hepatitis C are passed on through sharing works (needles, syringes, cookers, filters, cotton, water) used for shooting up. Infected blood - on the needle, in the syringe, or on any other works - gets into your body. You can't always see the blood. Hepatitis C can live in blood for days outside of the body.

Create your own clean space – a newspaper or magazine to spread your things out on. Clean the injection site with soap and water or alcohol before injecting.

It's safest to use a new needle and syringe each time you shoot up.

Keep a personal syringe. If you have to reuse a syringe, it's better that it's one that's only been used by you.

If you have to share, always clean the needle and syringe with bleach and water. Some needle exchanges can give you bottles of sterile water and bleach. If sterile water is not available, use boiled water if possible. Any brand of household bleach will do.

We don't know how long you need to clean needles with bleach in order to kill hepatitis C. It may be longer than the 1 ½ - 2 minutes used to kill HIV. Dry blood can stick to the sides of the needle and syringe, and even following the directions completely may not thoroughly clean the works.

To clean your needle and syringe:

Step 1 Fill the syringe completely with clean, cold water. Shake the syringe for 30 seconds. Squirt out the water. *Repeat this step twice, and use new water each time.*

Step 2 Fill the syringe completely with full strength bleach. Most HIV prevention programs recommend doing this for 30 seconds (time it with a watch or count to 100) and repeating three times (with fresh bleach each time). But one study found that it takes at least two minutes to eliminate hepatitis B, which, like hepatitis C, is much sturdier than HIV.

Step 3 In order to rinse the bleach out of the syringe, fill the syringe again with new water and shake the syringe for 30 seconds. Squirt out the water. *Repeat this step at least twice, and use new water each time.*

Most people grossly *underestimate* the time they actually use the bleach and water. Use a watch with a secondhand!

Also, remember to clean your cooker (spoon) with bleach and water and use a new filter (for drawing the prepared drug into the syringe) every time. Contact your nearest needle exchange or AIDS organization for more information.

